AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph beginning at **page 10, line 19**, and insert the following rewritten paragraph:

In the method (1) of manufacturing a circuit board according to the invention, a solution, in which a resin to be used for the second resin layer is dispersed in a liquid in a particle state, is used to form the second resin layer. The resin particle is charged to be positive or negative. As shown in Fig. 101, ~~when~~ a development electrode 19 is disposed to be opposed to a circuit forming substrate 4, and ~~where~~ a ~~conducive~~ conductive layer 2 is provided on a surface and an internal wall of a hole 3 with stacking ~~and~~ a first resin layer 5 ~~is stacked~~thereon. When ~~, and~~ the conductive layer 2 of the circuit forming 4 is grounded, and ~~. In a case of~~ a proper bias voltage being applied, a charged resin particle 20 is electrophoresed in a direction of the circuit forming substrate 4 in accordance with an electric field E. Fig. 101 shows the case in which the resin particle 20 is charged to be positive and a positive bias voltage is applied. Also in the case in which the resin particle is charged to be negative and a negative bias voltage is applied, the resin particle 20 is electrophotoresed in the direction of the circuit forming substrate 4 in the same manner.

Please replace the paragraph beginning at **page 37, line 19**, and insert the following rewritten paragraph:

Thereafter, an exposing step is carried out to crosslink the photo-crosslinkable resin layer 25 in a portion corresponding to a non-circuit portion (Fig. 49). Subsequently, the second resin layer and the unreacted photo-crosslinkable resin layer are removed to form a plated resist layer constituted by a crosslinked portion 26 (Fig. 50). After the plated resist layer is formed, a second conductive layer 13 is formed on a surface in a portion, in which ~~to which~~ the first conductive

layer 12 is exposed by an electrolytic plating processing (Fig. 51). Then, the crosslinked portion 26 (the plated resist layer) is removed (Fig. 52) and the thin first conductive layer 12 provided under the plated resist layer is removed by etching, thereby forming a circuit board (Fig. 53). The hole may be filled or not filled with the second conductive layer. Figs. 51(a), 52(a) and 53(a) show a state in which the hole is not filled with the second conductive layer 13, and furthermore, Figs. 51(b), 52(b) and 53(b) show a state in which the hole is filled with the second conductive layer 13.

Please replace the paragraph beginning at **page 45, line 14**, and insert the following rewritten paragraph:

Moreover, a maximum height of the conductive layer in a non-coupling portion of the hole land is equal to or greater than -5μm and is equal to or smaller than a thickness of the conductive layer in the circuit portion. In the non-coupling portion of the land of the hole, therefore, the circuit board is <u>hardly</u> influenced by a temperature and a humidity ~~with difficulty~~. Thus, the circuit board has a high reliability. The reason is that a corner portion of ten insulating substrate which is presumed to receive a load most greatly in the circuit board is protected with the conductive layer. When a height of the conductive layer in the non-coupling portion of the hole land is smaller than -5μm, an exposure area of the insulating substrate is increased so that the influence of the temperature and the humidity is increased. When the thickness of the conductive layer in the circuit portion is exceeded, moreover, the hole portion becomes convex so that a resistance to a mechanical shock is reduced or a hindrance to a step of mounting the circuit board is caused.

Please replace the paragraph beginning at **page 46, line 2**, and insert the following rewritten paragraph:

A circuit board (14) according to the invention is characterized in that a

sectional shape of the conductive layer in the circuit portion is different from that of the conductive layer in the land portion. A circuit board (15) according to the invention is characterized in that a portion having a maximum height is present within a range of a thickness of the conductive layer in the hole, which is formed from the internal wall of the hole in the conductive layer of the land.

Please replace the paragraph beginning at **page 48, line 16**, and insert the following rewritten paragraph:

Fig. 74 is a schematic sectional view showing a through hole in which the hole is filled with a conductive layer. Fig. 74(a) shows an example in which the land width is greater than 0μm and is equal to or smaller than 40μm. In Fig. 74(b), the land width is 0μm. In the circuit board according to the invention, if the height T1 of the conductive layer in the non-coupling portion of the land is equal to or greater than ~~-5~~ -5μm, and is equal to or smaller than the height T2 of the conductive layer in the coupling portion of the land and the land width L is equal to or smaller than 40μm, the inner part of the hole may be thus filled with the conductive layer.

Please replace the paragraph beginning at **page 49, line 9**, and insert the following rewritten paragraph:

Fig. 76 is a schematic sectional view showing a via hole. Fig. 76(a) shows an example in which the via hole is filled with the conductive layer, the height T1 of the conductive layer in the non-coupling portion of the land is equal to or greater than 0μm, but equal to or smaller than the height T2 of the conductive layer in the coupling portion of the land, ~~is equal to or smaller than T2~~ and the land width L is equal to or smaller than 40μm. Fig. 76(b) shows an example in which the via hole is not filled with the conductive layer, the height T1 of the conductive layer in the non-coupling portion of the land is equal to or greater than 0μm, but equal to or smaller than the height T2 of the conductive layer in the coupling portion of the land, ~~is equal~~

~~to or smaller than T2~~ and the land width L is equal to or smaller than 40μm.

Please replace the paragraph beginning at **page 49, line 24**, and insert the following rewritten paragraph:

Fig. 67 is a schematic plan view showing the hole land portion of the circuit board according to the invention. In the circuit board according to the invention, it is desirable that a difference between maximum and minimum values of the land width should be equal to or smaller than 8μm, and should be more preferably equal to or smaller than 5μm. In this state, the hole and the land are formed continuously like a concentric circle. In the state in which the difference between the maximum value and the minimum value is equal to or smaller than 8μm, a center of the hole and that of the land are rarely shifted from each other. Therefore, the circuit board according to the invention satisfies a requirement for causing the land width to be uniform. In other words, the circuit board according to the invention is hardly influenced by precision in a positional shift in a manufacturing process ~~with difficulty~~. When the difference is greater than 8μm, the land is not formed in a uniform width around the hole as shown in Fig. 100(a). Consequently, the circuit board has a low reliability.

Please replace the paragraph beginning at **page 51, line 15**, and insert the following rewritten paragraph:

Description will be given to a method of manufacturing a circuit board and a material related to the circuit board according to the invention. For an insulating substrate having a conductive layer on a surface and an internal wall of a through hole or/and a non-through hole according to the invention, it is possible to use a configuration in which a hole is provided on a laminated plate in which a conductive layer foil is bonded to the insulating substrate and a plated conductive layer is then provided on a surface of the laminated plate including the internal wall of the hole by a plating processing, a configuration in which the hole is provided on the insulating

substrate and a conductive layer is then provided on the surface including the internal wall of the hole by a sputtering method, an evaporation method, a nonelectrolytic plating processing, a nonelectrolytic plating processing – electrolytic plating processing, ~~and~~ or a coating processing, and a configuration in which a hole is provided on the laminated plate having the conductive layer foil bonded to the insulating substrate and a conductive layer is separately provided on only the internal wall of the hole by means such as a nonelectrolytic plating method. The conductive layer foil can also be subjected to an etching processing to be a thin film after the bonding.

Please replace the paragraph beginning at **page 53, line 16**, and insert the following rewritten paragraph:

The photo-crosslinkable resin layer to be used as the first resin layer according to the methods (5) and (8) of manufacturing a circuit board according to the invention includes a photo-crosslinking type (negative) dry film photoresist for manufacturing a circuit board which is used generally. Examples will be given, and any photo-crosslinkable resin can also be applied if it does not depart from the gist of the invention. For example, such a photo-crosslinkable resin might be a binder polymer containing a calboxylic acid group, a photopolymerizing multifunctional monomer, a photopolymerizing initiator, a solvent and other negative photosensitive resin compositions constituted by additives. Their mixing ratio is determined depending on demanded properties such as a sensitivity, a resolution, a hardness and a tenting property. These examples have been described in "Photopolymer Handbook" (edited by Photopolymer Special Meeting and issued in 1989 by Kogyo Chosakai Publishing Co., Ltd.) and "Photopolymer Technology" (edited by Aya Yamaoka and Mototaroh Nagamatsu and issued in 1988 by THE NIKKAN KOGYO SHIMBUN LTD.). For example, it is possible to use Riston manufactured by DuPont MRC Dry Film Co., Ltd., PhoTec manufactured by Hitachi Chemical Co., Ltd., and SUNFORT manufactured by ASAHI KASEI CORPORATION as products put on the market.

Please replace the paragraph beginning at **page 54, line 9**, and insert the following rewritten paragraph:

If the photo-crosslinkable resin layer to be used as the first resin layer according to the invention has a three-layer structure interposed between a carrier film (polyethylene terephthalate) and a protective film (polyethylene), it is suitable for ~~storage and~~preservation and the usage of bonding. If blocking does not become a problem, it is also possible to use a two-layer structure which does not use the protective film.

Please replace the paragraph beginning at **page 56, line 9**, and insert the following rewritten paragraph:

Any method of sticking the first resin layer to the surface conductive layer may used if it is possible to provide the first resin layer without generating an unevenness and a waviness ~~on~~ of the first resin layer and mixing air or dust into a sticking surface. For example, there is used an apparatus for pressing a thermal rubber roll for a printed board by pressure, thereby carrying out a lamination.

Please replace the paragraph beginning at **page 56, line 28**, and insert the following rewritten paragraph:

The developing solution for the first resin layer according to the invention serves to dissolve the first resin layer therein, and a developing solution corresponding to a composition of the first resin layer to be used is utilized. The first resin layer provided over the hole is removed with the developing solution and only the upper part of the hole is opened. For the developing solution for the first resin

layer, it is possible to use any solution on the condition that the first resin layer is dissolved ~~by a thickness of the film~~to the extent of the film thickness (that is, the second resin layer is not swollen and a shape is not changed at the step of forming an opening portion) even if the second resin layer is insoluble or the second resin layer is slightly dissolved. In the case in which an alkali soluble resin is used for the first resin layer, an alkali solution is usefully utilized. For example, it is possible to use a solution of an inorganic basic compound such as alkali metal silicate, alkali metal hydroxide, alkali metal phosphate and carbonate, or ammonium phosphate and carbonate, and an organic basic compound such as ethanol amines, ethylenediamine, propanediamines, triethylene tetramine and morpholine. These solutions control the solubility of the second resin layer. Therefore, it is necessary to regulate a concentration, a temperature and a spray pressure. After opening with the developing solution, the progress of the development is stopped by washing or an acid treatment.

Please replace the paragraph beginning at **page 57, line 24**, and insert the following rewritten paragraph:

The second resin layer according to the invention is insoluble or slightly soluble in the developing solution for the first resin layer, and any resin which can be used in an electrodepositing method may be employed. For the second resin layer, a solution used for the second resin layer is ~~a solution~~ obtained by dispersing~~, in a liquid, a resin used for the second resin layer in a~~ the particle state resin in a liquid. The particle is charged to be positive or negative. For the liquid, it is possible to use water or an electrical insulating liquid. In the case in which the water is used, the second resin layer contains, as a principal component, a polymer having a proper acid value and is neutralized with organic amine, thereby forming a colloidal particle charged in the water. In the case in which the electrical insulating liquid is used, a resin such as an acrylic resin, a vinyl acetate resin, a vinyl chloride resin, a vinylidene chloride resin, or a vinyl acetal resin such as polyvinyl butyral, polystyrene, polyethylene, polypropylene and their chlorides, a polyester resin such

as polyethylene terephthalate or polyethylene isophthalate or a polyamide resin, a vinyl denatured alkyd resin, gelatin, a cellulose ester derivative such as carboxymethyl cellulose is dispersed in a particle state in an electrical insulating liquid. The resin particle can be also made by containing ~~caused to contain~~ a charge control agent. It is necessary to separately use the charges to be positive or negative depending on the positive or negative state of a bias voltage in the formation of the second resin layer. For a solution obtained by dispersing the resin for forming the second resin layer in the electrical insulating liquid, it is possible to suitably use a wet toner for electrophotography.

Please replace the paragraph beginning at **page 58, line 24**, and insert the following rewritten paragraph:

The second resin layer can be formed by disposing a development electrode to be opposed to a circuit forming substrate to which the first resin layer is bonded and filling a solution having a charged resin particle dispersed in a liquid between the circuit forming substrate and a development electrode, grounding the conductive layer of the circuit forming substrate and applying a proper bias voltage. For example, it is possible to use developing apparatuses described in publications of JP-A-2004-163605 and JP-A-2002-132049. It is possible to determine the thickness of the second resin layer by controlling the charge of the resin particle and a voltage to be applied, a delivery speed and an amount of supply of a resin particle dispersing solution. The resin particle stacked by the electrodepositing method is fixed onto the first resin layer by heating, pressure, light ~~and~~ or a solvent so that the second resin layer is obtained. By setting the second resin layer to be a resist layer, the first resin layer provided over the hole is removed with the developing solution for the first resin layer.

Please replace the paragraph beginning at **page 62, line 21**, and insert the following rewritten paragraph:

Examples of the method of removing the fourth resin layer include a method using an organic solvent, an alkali solution, an acid solution ~~and~~ or an aqueous solution, a tape peeling method ~~and~~ or a polishing method. For example, an acid solution includes sulfuric acid, acetic acid, hydrochloric acid, aqueous ammonium chloride, aqueous hydrogen peroxide and a copper ion containing solution, a copper ion containing solution, ~~and~~ or an iron ion containing solution. Moreover, it is possible to use the tape peeling method and the polishing method.

Please replace the paragraph beginning at **page 64, line 2**, and insert the following rewritten paragraph:

For an unreacted photo-crosslinkable resin layer removing solution, there is used a developing solution which can dissolve or disperse the photo-crosslinkable resin layer and corresponds to a composition of the photo-crosslinkable resin layer to be used. In general, an alkali solution is utilized usefully and it is possible to use a solution of an inorganic basic compound such as alkali metal silicate, alkali metal hydroxide, alkali metal phosphate and carbonate, or ammonium phosphate and carbonate, and an organic basic compound such as ethanol amines, ethylenediamine, propanediamines, triethylene tetramine and morpholine. In these solutions, it is necessary to regulate a concentration, a temperature and a spray pressure. It is possible to quickly stop the removal of the photo-crosslinkable resin layer by carrying out washing or an acid treatment subsequently to a treatment performed by the photo-crosslinkable resin layer removing solution. In order to remove a crosslinked portion in the photo-crosslinkable resin layer after use as the etching resist layer, it is possible to use a strong alkali solution containing sodium hydroxide, potassium hydroxide ~~and~~ or metasodium silicate, alcohol and an organic solvent such as ketone.

Please replace the paragraph beginning at **page 64, line 31**, and insert the

following rewritten paragraph:

In the method of manufacturing a circuit board according to the invention, a method of exposing a light to a photoconductive layer and a crosslinking reaction of the photo-crosslinkable resin layer are carried out by laser direct drawing, an adhesion exposure through a photomask and a projection exposure. It is possible to use an extra-high pressure mercury lamp, a high pressure mercury lamp, a metal halide lamp ~~and~~ or a xenon lamp.

Please replace the paragraph beginning at **page 69, line 7**, and insert the following rewritten paragraph:

As a circuit forming substrate, a copper-clad laminate including a copper foil having a thickness of 12μm in a size of 200 X 200 X 0.4 mm was used to form a plurality of through holes having a diameter of 0.15 mm by means of a drill. Next, the first resin layer was laminated on the 120℃ preheating condition by using a laminator for a dry film. Then, a polyethylene terephthalate film was peeled at room temperature. Thereafter, ~~the polyethylene terephthalate film was peeled at the room temperature and~~ heating was carried out at 80℃ for one minute to eliminate an unevenness of peeling and charging on the first resin layer which is generated by peeling the polyethylene terephthalate film.

Please replace the paragraph beginning at **page 73, line 1**, and insert the following rewritten paragraph:

By using a laminator for a dry film photoresist under an yellow safe light, a dry film resist having a thickness of 10μm which is put on the market was thermo-compression bonded to both sides of the substrate so that a photo-crosslinkable resin layer was provided on a conductive layer formed on a surface. A photomask having a circuit pattern drawn thereon (a conductor width and a gap : 50μm) was

mounted and an ultraviolet exposure was carried out for 30 seconds by using a high pressure mercury lamp light source apparatus for printing which has a chuckingbaking ~~which has a sucking and adhering~~ mechanism (UNILEC URM300 manufactured by USHIO INC.). Furthermore, the substrate was inverted to carry out the exposure to the photo-crosslinkable resin layer on a reverse surface in the same manner so that a crosslinked portion of the circuit pattern was formed. After the carrier film was peeled, an uncured photo-crosslinkable resin layer was eluted and removed by using a 1% by mass sodium carbonate solution (30℃) so that an etching resist layer formed by the crosslinked portion was formed.

Please replace the paragraph beginning at **page 80, line 30**, and insert the following rewritten paragraph:

Then, a photomask (conductor width and space: 50 μm) having a circuit pattern drawn thereon was mounted. Thus, by using a high pressure mercury lamp light source device for burning having a ~~suction contact~~chucking mechanism (UNILEC URM 300, manufactured by USHIO INC.), exposure to ultraviolet radiation was carried out for 30 seconds. Further, the substrate was inverted, so that the exposure was also carried out in the same manner on the photo-crosslinkable resin layer on the opposite side. As a result, the crosslinked portion of the circuit pattern was formed.

Please replace the paragraph beginning at **page 93, line 12**, and insert the following rewritten paragraph:

A through hole having a size of 0.15 mmφ was formed on a glass base material epoxy resin substrate (an area of 340 mm X 510 mm and a thickness of a base material of 0.1 mm) and a desmear processing was then carried out. Subsequently, a nonelectrolytic plating processing was carried out to provide a nonelectrolytic copper plated layer having a thickness of 0.5μm as a first conductive

layer on an internal wall of the through hole and a surface of the substrate. An alkali soluble resin shown in the Table 1 was applied to either side of a dry film photoresist for circuit formation which had a thickness of 20μm to form an alkali soluble resin layer having a thickness of 5μm, and a dry film photoresist was stacked in contact with a first conductive layer so that a multilayer photo-crosslinkable resin layer was provided on the first conductive layer. Then, a Mylar film was peeled at room temperature and heating was carried out at 80℃ for one minute so that ~~an~~charging unevenness by ~~of~~ peeling ~~and charging~~ was eliminated.

Please replace the paragraph beginning at **page 97, line 14**, and insert the following rewritten paragraph:

By using the 1% by mass sodium carbonate solution (30℃) again, the first resin layer in the through hole portion was removed. By an observation through the microscope, the first resin layer in the through hole portion was removed concentrically from the inner side of ~~with~~ the through hole. There were obtained a through hole diameter of L18 = 150μm in perforation, a through hole diameter of L19 = 125μm in copper plating and a diameter of the first resin layer removing portion of L20 = 158μm as shown in Fig. 91.

Please replace the paragraph beginning at **page 101, line 9**, and insert the following rewritten paragraph:

Only the first resin layer formed over the hole which is not provided with the second resin layer was eluted and removed by using an alkali solution so that an open substrate having a resin shown in Fig. 85 was formed. The open substrate having a resin was observed by means of a microscope. Consequently, there was observed a part of the hole portion in which the first resin layer and the second resin layer were not present. By changing the conditions of the alkali ~~elusion~~solution, the

through hole diameter L1 in the perforation, and the through hole diameter L2 in the copper plating, and the diameter L3 of the first resin layer removing portion shown in Fig. 85 were obtained as shown in Table 5.

Please replace the paragraph beginning at **page 107, line 27**, and insert the following rewritten paragraph:

A treatment was carried out with an iron(III) chloride type etchant (40℃, a spray pressure of 3.0 kgf/cm^2) to remove an electrolytic copper plated layer, a nonelectrolytic copper plated layer and a copper layer of a copper-clad laminate which were exposed. The photo-crosslinkable resin layer after the end of the etching processing was ~~confirmed~~ observed. Consequently, some parts of the photo-crosslinkable resin layer were peeled in the through hole portion. The crosslinked portion of the photo-crosslinkable resin layer used as the etching resist layer was removed with a 3% by mass sodium hydroxide solution (40℃) so that a circuit board was obtained. The circuit board thus obtained was observed by means of a microscope. Consequently, a through hole diameter in perforation was 150μm and a through hole diameter of a copper plated portion was 125μm. A land diameter was 240μm. A difference between maximum and minimum values of a land width was measured based on 100 points. Consequently, a maximum value was 17μm and the land was not formed concentrically with the through hole, and the land width was nonuniform. Moreover, a step was generated in a portion from which the photo-crosslinkable resin layer was peeled.